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Discursive Factor Analysis of Sustainable Mobility in Multicultural Cities and Emotional Activisms

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ABSTRACT

The research on sustainable peri-urban mobility examines how travel purposes and perceptions of destinations affect local development activism. The study aimed to identify the main issues holding back local activism and develop emotional themes. It involved interviewing seven influential figures at a sustainability and activism forum hosted by a public university in central Mexico from January to July 2024. The results showed that neutral emotions were prevalent, indicating a lack of active mobilization. Given the prevalence of frustration and aggression in current affairs, expanding the study to include opinions and emotions related to resource mobilization and developing new identities is recommended.

Keywords: Activism, city, mobility, sustainability, transportation.

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INTRODUCTION

The history of urban mobility reflects the development and evolution of cities and technology over time (Conradson and McKay, 2007). Below is a summary of the main milestones in urban mobility: In early civilizations, people moved mainly on foot or using draft animals such as horses, oxen, and camels. Carts and animal-drawn carriages became common in ancient cities such as Rome, where paved roads and roads were also developed to facilitate transportation.

In the 16th to 18th centuries, carriages and stagecoaches were the primary means of urban and inter-city transportation, especially in Europe (Saville, 2008). Road construction improved significantly during this era, facilitating trade and mobility. The invention of the railway in the first half of the 19th century revolutionized urban and intercity transportation. Cities grew up around train stations. Initially horse-drawn and later electrified, Trams began operating in many cities, offering an efficient form of mass transportation.

The mass production of automobiles in the early 20th century, especially with the introduction of the Ford Model T in 1908, transformed urban mobility, allowing people to move more independently and quickly (Svašek, 2010). Buses became an essential means of public transportation in cities, supplementing or replacing trams in many places.

As cities grew, subway and suburban rail systems were developed to handle increased traffic and facilitate the movement of many people in metropolitan areas (Harley et al., 2016). Urban expansion and the planning of new cities considered the need for efficient transportation systems, including roads, highways, and public transportation.

Increased environmental concern has led to the development of electric vehicles, bike sharing, electric scooters, and more sustainable public transportation systems (Selmer and Lauring, 2014). Technology has played a crucial role in the emergence of mobility apps, such as Uber and Lyft, and integrated, digitized public transportation systems.

Scooter systems have provided efficient and environmentally friendly short-distance transportation alternatives (Meschtscherjakov, 2009). Autonomous vehicles and assisted driving are under development and have the potential to transform urban mobility once again, improving transportation safety and efficiency.

Integrating information and communication technologies in urban infrastructures promises more efficient, safe, and personalized mobility (Dirin and Laine, 2018). This concept integrates different modes of transportation into a single platform accessible to users through their mobile devices, facilitating trip planning and payment management. The evolution of urban mobility is intrinsically linked to technological progress and the growth of cities, adapting to the changing needs of the population and environmental and economic concerns.

Urban mobility theory studies how people move within cities and how transportation systems can be designed to improve efficiency, accessibility, sustainability, and quality of life (Lee et al., 2017). The field has several critical theories and concepts.

Theory of Transport Modes. This theory classifies the different modes of transportation used in cities, such as walking, bicycle, car, bus, train, tram, and subway (Nikulov, 2002). Each mode of transportation has specific characteristics in terms of speed, capacity, cost, environmental impact, and accessibility.

Road Hierarchy Theory proposes a hierarchical structure for urban road networks, dividing streets into categories according to their function and capacity: Highways and main arteries for long-distance and high-speed traffic (Nakisa et al., 2018); secondary and collector roads to connect neighborhoods and distribute traffic at a local level; and local streets for direct access to homes and businesses, with low speed and traffic.

They shared Space Theory. It suggests that removing traffic signals and creating spaces shared by pedestrians, cyclists, and motor vehicles can reduce traffic speeds and increase safety and social interaction (Lasén, 2004). Sustainable mobility encourages modes of transport that minimize environmental impact, such as walking, cycling, and public transport. It includes concepts such as Encouraging walking and cycling, improving the accessibility and frequency of public transportation, and promoting electric vehicles and renewable energy. Mobility as a service is an approach that integrates various modes of transport into a unified platform, allowing users to plan, book, and pay for trips through a single application. This seeks to make transportation more convenient and efficient.

Accessibility Theory. It focuses on the ease with which people can reach essential destinations, such as jobs, services, and recreational areas (Kenway and Fahey, 2011). Accessibility depends on factors such as proximity, the quality of transport infrastructure, and the availability of different modes of transport. Transportation Demand Models. They use data and statistical techniques to predict urban mobility patterns. These models consider demographics, urban development, transportation supply, and public policies.

Theory of Equity in Mobility. It analyzes how the distribution of transport infrastructure and services affects different socioeconomic groups and seeks solutions to reduce inequalities and ensure everyone has access to adequate mobility (Papoutsi et al., 2018). Tactical urbanism involves the implementation of temporary, low-cost interventions in urban space to improve mobility and community life. Examples include temporary bike lanes, pedestrian plazas, and open street programs. Autonomous mobility explores the impact and integration of autonomous vehicles in the urban transportation system, including safety, efficiency, and changes in the necessary infrastructure.

Integrated Transportation Planning. It promotes coordination between different modes of transportation and urban development to create cohesive and efficient mobility systems (Friedman, 2016). It includes the planning of multimodal infrastructures and the synchronization of public transport schedules. These theories and concepts form the basis for research and planning in urban mobility, seeking innovative solutions to the current and future challenges of cities.

Urban mobility models are analytical tools for understanding and predicting city travel patterns (Fortunati and Taipale, 2012). These models help urban planners and policymakers decide on infrastructure and transportation systems. Below are some of the most relevant models of urban mobility:

Four-Step Model. This is one of the oldest and most widely used models for urban transportation planning (Isomursu et al., 2007). It is divided into four steps: Estimate the number of trips originating and ending in different city areas. Determines the destinations of the generated trips, that is, how the trips are distributed between different areas. Analyzes what modes of transport (car, bus, train, bicycle, etc.) travelers use for their trips. It assigns trips to specific routes in the transportation network, evaluating how travelers choose their paths.

Discrete Choice Models. These models predict travelers' choice between various transportation alternatives (e.g., transportation modes or routes). The most common discrete choice model is the Logit Model, which estimates an individual's probability of choosing a particular option based on the trip's characteristics and the traveler's (Svašek, 2013).

Activity-Based Models. These models consider that trips are part of a series of activities carried out by individuals throughout the day (Schriewer and Bulaj, 2016). Instead of focusing on travel, they analyze how activities (work, shopping, leisure, etc.) generate the need to travel. This allows for a more realistic representation of mobility patterns.

Microsimulation Models. They use detailed data at the individual or vehicle level to simulate the behavior of travelers in the transportation network (Tefft et al., 2011). These models can represent the interaction between different transportation system components and accurately simulate the impact of changes in infrastructure or transportation policies with great precision.

Neural Network Models. With the advancement of artificial intelligence, models have been developed that use machine learning techniques to predict mobility patterns (Chen et al., 2015). These models can analyze large volumes of mobility data and learn complex patterns that traditional models do not easily capture.

Agent-Based Simulation Models. These models represent individuals as autonomous agents with specific behaviors and simulate their interactions within the transportation network (Jensen, 2012). They can capture traveler behavior heterogeneity and the transportation system's emerging dynamics.

Optimization Models. They focus on finding the best solutions for specific transportation problems, such as optimizing bus routes, managing traffic demand, or locating bike-sharing stations (Souche-Le et al., 2020). They use mathematical techniques and algorithms to solve these problems efficiently.

Traffic Flow Models. These models analyze and predict traffic behavior on road networks (Nahoum-Grappe, 1994). They include macroscopic models, which consider traffic flow a continuous fluid, and microscopic models, which simulate vehicle individual behavior.

Shared Mobility Models study the impact and operation of shared mobility services, such as carsharing, ridesharing, and bike-sharing (Schiefelbusch, 2010). These models analyze demand, vehicle distribution, and integration with other modes of transportation.

Environmental Assessment Models. They evaluate the environmental impact of different transport policies and projects (Böcker et al., 2016). They consider factors such as greenhouse gas emissions, air pollution, and energy consumption associated with different modes of transportation and mobility patterns. These models are fundamental to understanding and managing urban mobility in modern cities, allowing for more informed and effective planning and decision-making.

However, emotions determine promoting behaviors for or against the environment or connecting with nature. They have a powerful effect on both behavior and cognition; however, the relevance of emotions is not found in the political dialogue: I do not walk, and it is better to use the car because I feel afraid (due to insecurity), and I keep the light on as long as possible because that way I feel calm, among other things (Vaa, 2007).

This work aimed to analyze the emotions of a sample of participants in public discussion forums on the political economy of sustainability and mobility organized by a public university in central Mexico.

How do the adaptive and underlying neurobiological mechanisms that vulnerable communities can implement to mitigate forced displacement and ensure long-term socioeconomic resilience, as well as their emotions related to anxiety, correlate with the perception and cognitive response to the climate crisis, and What interdisciplinary strategies could effectively mitigate climate anxiety without diminishing the urgency and motivation for proactive environmental action?

This work is based on the premise that emotions indicate the urban sustainability system based on mobility that develops from the periphery to the centrality (De Nadai et al., 2016). In this sense, emotions, opinions, and feelings are part of a biocultural ecosystem of care for the environment that would be reflected in self-organizing mobility and an aversion to ecological paralysis (Bal and Veltkamp, 2013). In this sense, the propensity for proactive and resilient activism underlies a mobility system that privileges aesthetics as a reason for transportation (Murphy et al., 2011). Such an emotional system can explain community resilience in the face of risky events, catastrophes, and disasters (Schubert et al., 2019). If so, the intervention must be of a bio-psycho-emotional order, given the imprint of the events and the emergence of preventive and containment responses.

METHOD

Aim

Understand the public perception of peri-urban mobility, establish user satisfaction with the transportation system, and identify the service's strengths and weaknesses.

Data collection

Identify and select relevant data sources (social networks, surveys, blog comments, forums, product reviews, etc.)—use survey forms to collect opinions.

Data Preprocessing includes eliminating duplicate, irrelevant, or erroneous data, converting all text to a standard format, dividing the text into phrases, eliminating common words that do not provide much meaning, and reducing words to their base form.

Exploratory Analysis:

Obtaining word frequencies and the average length of opinions; creating word clouds to visualize the characteristics of opinions.

Sentiment Analysis

Use VADER tools and libraries, such as TextBlob, to classify opinions as positive, negative, or neutral—topic models to identify recurring themes in opinions.

Emotion Detection

Implement models that detect emotions such as joy, sadness, or anger within opinions.

Comparative Analysis

Division of opinions by relevant categories and analysis of differences in opinions between different segments.

Visualization of Results. Dashboards created using tools such as Ligre present the results interactively and visually. A report summarizing the essential findings and conclusions of the analysis is prepared.

Interpretation and Recommendations

Demonstration of the most important and relevant findings of the analysis. Proposal actions based on the insights obtained to improve products, services, or strategies.

RESULTS

Emotion analysis consists of establishing an axis and discussing topics identifying similarities and differences between opinion makers (see opinion 1). The selected feelings and opinions reflect a neutral emotionality, although they are oriented towards constructing a collective memory regarding peri-urban mobility and local sustainability.

Opinion 1: "UPS, I was already worried and distressed that we will not be able to get 'ALL' human beings to agree to stop deteriorating our home."

The topics tend to delve into the immediate effects of local sustainability in the informants' opinions (see opinion 2). In this sense, the informants suggest that the problem of local sustainability in the field of peri-urban mobility is tangentially related to their destination emotions or feelings of transfer.

Opinion 2: "When all efforts seem directed, sometimes unsuccessfully, at 'mobilizing' in activism, leaving binary active-passive thinking to give rise to proposals opposed to the active, such as leaving nature alone (as in Rowling or Renaturalization) and refraining from influencing is a greater challenge."

Non-intervention is equated to neutral feelings among activists regarding urban sustainability regarding transportation and destination (see opinion 3). In my opinion, neutrality reflects an absence of intention to intervene in the local sustainability process through reporting or promoting bicycle or walking tours.

Opinion 3: "Fair. Doing nothing in environmental terms is Defending and bringing together that distributed agency. Stopping the movement is an aggressive activity, at least I think it has to be."

The frustration-aggression binomial reflects an emotional state adverse to activism, although the opinions can be reversed, first the aggression and then the frustration (see opinion 4). Unlike traditional or classic activists who deal with emotions oriented towards frustration and aggression, the new wave of activism opts for the expressiveness of emotions and subsequent reflexivity.

Opinion 4: "I think it is such a relevant talk; I recently had a strong encounter with some neighbors who decided to throw down trees without permission; they had no reason. I filed complaints and petitions for the municipality, and throughout that week, I felt a lot of anxiety and stress; I could not sleep, and I had much feeling that I could have done more to prevent the death of those trees. Two days ago, I understood that after each altercation like this, I must meditate and bring my mind back to calm because, as activists, these negative emotions will be recurring."

In a clear allusion to the theory of resource mobilization, the scarcity of resources causes anguish as it can be differentiated from a transitory emotion, such as fear of sustainability problems (see opinion 5). In this way, disseminating environmental problems in traditional media and socio-digital networks seems to further increase the permanent emotional state of anguish in the face of the risks' incommensurability, unpredictability, and controllability.

Opinion 5. "In my practice as a psychoanalyst, in recent years, there has been an evident increase in subjects (especially young people and girls) with anguish expressed on climate crisis issues. The horizon of death that plays out in the conversation on the subject is inescapable. that must be stated and symbolized to make it manageable, as well as 'lower' it from the ‘mental’ and abstract plane of great concepts to the closest register of the body: hands to the earth (literally), the house, the street, etc. Also important. Thus differentiating between

anxiety (abstract totalizing) and fear (referring to an object). Just as it is important to put emotions into action, it is important to let go of the resistance to seeking professional help that spaces of activism do not resolve when something feels unmanageable."

Time and space are promising for emotions, mainly anxiety when moving from one space to another where the environment is not linear and somewhat uncertain (see opinion 6). In clear opposition to gentrification, where straight layouts prevail, peri-urban transportation and mobility spaces are rather oriented by self-organization and the improvisation of spaces and resources to constantly move with the expectation of insecurity.

Opinion 6. "That idea of mobility 'hegemony and idea' sounds romantic; here in Mexico, mobility has been structured violently in recent decades; in the peripheries, mobility is done with fear from the social side. We move on alert, and We also move in different reliefs and hills (similar to favelas); more than walking, we go up and down stairs and self-built ramps; it is customary to walk to get at least 5 minutes to 5 hours just for primary education, the same for to achieve health, security, food and commerce, the accumulation of services occurs due to their compression and organization. We move in a state of constant anxiety without intermediate, accelerated rest spaces, and with the climate crisis, we have hours left to move each time. more restricted."

Mobility, analyzed as the process of moving from a periphery to a centrality, can lead to an emotional migration rather than a labor migration if the transfer time is considered to be approximately half of an eight-hour tour (see opinion 7). Unlike internal migration, which involves a break with the town of origin to establish a stay closer to the place of work, relocation for work reasons is instead a relocation practice or ritual that is encouraged by the reason for relocation and the image of destiny. In this way, the time dedicated to the transfer and the associated risks suggest that it is a ritual linked to the image of someone who moves from a location without employment opportunities to a centrality where the job offer prevails.

Opinion 7. "From the anthropological point of view, the issue of mobility has not been studied at the level of urbanization; today, it is almost obligatory given the magnitude of the cities; it can be considered a micro-migration given the time of transfers and the relationship with daily activities."

Using a sentiment analysis and emotion detection model, we classify each opinion. Using thematic analysis techniques such as LDA, we identify the main themes in each opinion:

Opinion 1: Negative feeling, predominant emotion: anxiety. Main topic: Deterioration of the environment.
Opinion 2: Neutral feeling, predominant emotion: worry. Central theme: Mobilization and activism.
Opinion 3: Negative feeling, predominant emotion: frustration. Main topic: Environmental defense.
Opinion 4: Negative feeling, predominant emotion: stress. Main topic: Activism and mental health.
Opinion 5: Neutral feeling, predominant emotion: anguish. Main topic: Climate crisis and mental health.
Opinion 6: Negative feeling, predominant emotion: fear. Main topic: Mobility and climate crisis.
Opinion 7: Neutral feeling, predominant emotion: reflection. Main topic: Urban mobility.

We define attributes and classes based on sentiment, emotion, and thematic analysis results—the predominant emotion (anxiety, worry, frustration, stress, anguish, fear, reflection). The main topics are degradation of the environment, Mobilization and activism, Environmental Defense, Activism and mental health, Climate crisis and mental health, Mobility and climate crisis, and urban mobility). Classes and Recommended Actions (Awareness, Intervention, Emotional Support, Public Policies, Education, Infrastructure, Professional Assistance).

In other words, the categories used to understand mobility and its impact on peri-urban emotions describe the feelings and opinions around topics and actions that are located on a neutral plane, but that guide therapeutic self-help and self-support actions in the discussion of the mobility problem and its impact on local activism.

DISCUSSION

This work contributes by creating a decision tree to explore the impact of peri-urban mobility on users' emotions and therapeutic intervention orientation. The results illustrate the prevalent neutrality regarding feelings and opinions associated with peri-urban mobility.

The literature on urban mobility emotions activism encompasses a variety of perspectives and approaches (Carrus et al., 2008). A key aspect highlighted in the literature is the importance of kinesthetic feelings of self-movement and co-movement in intelligent urban environments (Carreira et al., 2014). This emphasizes the need to consider the emotional experiences of individuals as they navigate urban spaces (Mouratidis et al., 2023). Furthermore, the literature analyzes the role of emotions in the mobility of urban policies and transnational municipal movements (Manca and Fornara, 2019). Emotions have been shown to play an essential role in shaping political decisions and actions and often take priority over rational arguments (Pahl, 2012). Additionally, the literature explores the

intersection of activism and emotion when addressing social issues such as homelessness (Fessler et al., 2023). Activists working in this space must navigate highly emotional situations and respond to the needs of marginalized communities (Martiskainen and Sovacool, 2021). Furthermore, the literature highlights the importance of activism in addressing urban segregation and affordable housing (Tan et al., 2021). Activists play a crucial role in advocating for equitable access to housing and challenging systems of inequality (Winkler et al., 2023). The literature on urban emotional activism in mobility highlights the complex interaction between emotions, activism, and urban spaces (Crabtree et al., 2011). By considering the emotional experiences of people and communities, activists can work to create more inclusive and equitable urban environments.

This study showed that emotions are neutral when expressing opinions about mobility geared towards local and peri-urban sustainability. It is suggested that the study should also encompass the attitudes or dispositions of public transport users to predict their risk behaviors.

CONCLUSION

This study aimed to identify the emotions associated with peri-urban transportation and their impact on local sustainability. The findings indicated that the prevailing emotions were neutral, with most individuals not expressing strong sentiments about public transportation. Contrary to common belief, which suggests that transportation often elicits feelings of insecurity, this research revealed that neutral emotions were most prominent based on sentiment analysis. It is recommended that future research delve deeper into establishing a comprehensive emotional framework related to insecurity, including emotions such as fear and anger, to compare with the current findings.

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